MATLAB EXPO 2018

Cody Coursework Workshop
Auto-Evaluation Framework for MATLAB Assignments

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Before we start – a few questions

- How do you test learning of concepts?
- Which are courses with most potential for use of MATLAB?
- How do you typically evaluate code submitted by students?
- Is evaluation of code time-consuming?
- How would you ideally like to be using your time?
- How do you keep your students engaged?
Choose a problem in your field

- Choose a problem in your field
  - Electrical and Electronics – Signal Generation
  - Mechanical – Mass Spring Damper
  - Mathematics – Numerical Integration

- What is the expected solution?

- How do you check the solution for correctness? – Give test cases
Agenda

- Cody Coursework – Introduction

- Walkthrough
  - Student – Solving the assignment
  - Faculty - Setting up the course and the assignment

- Hands-on Experience
What is Cody Coursework?

- Cody Coursework helps faculty automate evaluation/grading of MATLAB programming assignments
Cody Coursework

- Visual environment for creating MATLAB problem sets
- Allows instructors to set up MATLAB assignments and automatically evaluate/grade them
- Allows students to test their solutions against the computer obtaining immediate feedback

Potential for usage in:

- Homework assignments
- Exams
- Practical sessions
- Many others (e.g., learn MATLAB, share problems)
A Walkthrough

https://coursework.mathworks.com

MATLAB EXPO 2018
Workflow

Faculty creates a course in Cody Coursework
- Assignments with Problem Sets
- Invites Students to the course

Student receives an email with an invite to the course
- Assignments with problems sets due on a particular date
- Students solves the problems, gets instant feedback and submits the assignment

Learning analytics
- Faculty is able to see how many students attempted the problems in the assignment, how many got it correct, number of attempts
- Faculty also able to download the MATLAB code submitted and the submission data in CSV format
Key points to be noted

https://coursework.mathworks.com

MathWorks hosted

Runs a cloud version of MATLAB – No local installation of MATLAB necessary
Cody Coursework – Student Workflow

1. Receive an Invitation
2. Enroll
3. Open an Assignment
4. Solve Problems
5. Submit Solutions
6. Check Progress
Cody Coursework – Student Workflow

1. Receive an Invitation

[Image of an email invitation to Cody Coursework demo course.

Invitation

Riddhi Ghosh is inviting you to attend Demo Course MATLAB Expo - Bangalore in Cody Coursework.
To get started:

View Invitation

Please do not forward or share this link.

Course Access

You need a MathWorks Account to access this course. Don’t have an account yet? Cody Coursework will create one.

You have been invited to enroll in the course:

Demo Course MATLAB Expo - Bangalore

Duration (IST): 12 Apr 2018 - 20 Apr 2018

Course Description:

This course lets you try out the Cody Coursework as a student.

Login

Sign In

Don’t have a MathWorks Account? Sign Up

Cody Coursework is a benefit of Software Maintenance Service. Learn more about Cody Coursework.
Cody Coursework – Student Workflow

2. Enroll

You have been invited to enroll in the course.

Demo Course MATLAB Expo - Bangalore

Assignments:
- Example Cody Coursework Assignment for Students
  - Linear Convolution
  - Vector Creation (Sum upto N terms)

Successfully enrolled you in the course.

Demo Course MATLAB Expo - Bangalore

Duration (IST): 12 Apr 2018 - 20 Apr 2018

Products:
- Signal Processing Toolbox

Course Description:
This course lets you try out the Cody Coursework as a student.
Cody Coursework – Student Workflow

3. Open an Assignment

Example Cody Coursework Assignment for Students

Visible: 12 Apr 2018 12:00 AM IST  Due: 19 Apr 2018 10:00 PM IST
Submissions Per Problem: 2

Try out this assignment to get a feel of how the students will attend a course.

Problems

- Linear Convolution
- Vector Creation (Sum upto N terms)
Cody Coursework – Student Workflow

4. Solve Problems

Linear Convolution

0 solutions submitted (week 2)

Given two discrete time-domain signals x and h, compute the linear convolution of x and h using the definition of convolution and store it in y.

Use the mathematical formula for convolution of two signals.

**Assessment**

**Test 1** (Click Submit to run.)

> **Test 2** (Pretest)
Cody Coursework – Student Workflow

5. Submit Solutions

Demo Course MATLAB Expo - Bangalore > Example Cody Coursework Assignment for Students >

✅ Linear Convolution

2 solutions submitted (max. 2) | View my solutions

Solution Details

Solution 2: All tests passed
Submitted less than a minute ago | ID: 7416636 | Size: 14

```matlab
function y = LinConv(x,h)
    y = conv(x,h); 
end
```

Assessment: Correct

- Test 1
- Test 2 (Pretest)
Cody Coursework – Student Workflow

6. Check Progress

**Linear Convolution**

2 solutions submitted (max: 2)  |  View my solutions

My Solutions

Sort by:

Date Created (Newest – Oldest)

View as:

List  |  Map

Solution 2: All tests passed
Submitted 3 minutes ago  |  ID: 7416636  |  Size: 14

```matlab
function y = LinConv(x,h)
    y = conv(x,h);
end
```

Solution 1: 0 of 2 tests passed
Submitted 3 minutes ago  |  ID: 7416630  |  Size: 14

```matlab
function y = LinConv(x,h)
    y = conv(x,h);
end
```
Example Cody Coursework Assignment for Students

Visible: 12 Apr 2018 12:00 AM IST  Due: 19 Apr 2018 10:00 PM IST
Submissions Per Problem: 2

Try out this assignment to get a feel of how the students will attend a course.

Problems

Linear Convolution

Vector Creation (Sum upto N terms)
Cody Coursework – Instructor Workflow
Course Setup Demo
Cody Coursework – Assessment Workflow

Student Submissions

Demo Course MATLAB Expo – For Testing

Example Cody Coursework Assignment for Students

Visibility: 12 Apr 2018 12:00 AM IST  Due: 19 Apr 2018 10:00 PM IST
Submissions Per Problem: 2

Try out this assignment to get a feel of how the students will attend a course.

Problems

- Linear Convolution
- Vector Creation (Sum upto N terms)
Cody Coursework – Assessment Workflow

Solutions Map

Linear Convolution

Student Solutions

Search:

View as:

List | Map

Click on any solution marker in the graph to display solution in this box.
Cody Coursework – Assessment Workflow

Rescore Solutions

Linear Convolution

Student Solutions
Search:

Enter student's last name or solution ID

View as:

List | Map

Click on any solution marker in the graph to display solution in this box.
Cody Coursework – Assessment Workflow

Create Reports

Create an Assignment Report

Report includes, for each student and problem:
- Best solution as of the due date (19 Apr 2018 10:00 PM IST)
- Best solution as of today
- All solutions

Output Format:
- CSV
- Excel
- MATLAB code files: Includes individual solution files, plus the reference solution and learner template. (Good for plagiarism detection software.)
Cody Coursework - Benefits

1. Auto-grade MATLAB Scripts and Functions  
   Benefits  
   Saves time on grading

2. Immediate Student Feedback  
   Student engagement

3. Learning Analytics  
   Improves student learning outcomes
Resources

- https://coursework.mathworks.com/
- https://in.mathworks.com/academia/cody-coursework
- https://in.mathworks.com/videos/matlab-cody-coursework-setting-up-a-course-92602
Use Case at Technical University Eindhoven

- **TU Eindhoven**

  Professor Quote: I am advocating for expanded use of Cody Coursework at TU/e. As some of my colleagues have already discovered, for any course that uses MATLAB, Cody Coursework is a highly effective tool that saves time and work and fully engages students in the course assignments.

- “The fact that you can get immediate feedback (or confirmation) on a quite complicated piece of code is really neat, and without it, debugging your own code would really be a mess. It also motivated me to get 100% score on all the MATLAB assignments.” Joost P.

- “Cody Coursework is a great platform. It gives me more confidence about my solution rather than waiting for the instructor evaluation.” Manoj P.

- “My experience with Cody Coursework was very positive. The green checkboxes are an extra motivation to get a high grade.” Koen B.

- “The most useful feature of Cody Coursework was the ability to check our solutions against various test cases, which helped in debugging our code and formulating it in a much more generalized manner.” Amrith V

- “I like that you receive feedback immediately, which makes it much easier to find problems in your code… I learned a lot from the MATLAB assignments in a relative short period.” Ruud S.
Call To Action

- Identify use of MATLAB in your coursework and assignments
- Look at Cody Coursework documentation to learn more about how to create a course
- Reach out to us if you need help setting up a course
  - Riddhi.Ghosh@mathworks.in
  - Ramanuja.Jagannathan@mathworks.in
  - Viju.Ravichandran@mathworks.in